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Tree Farm Licence 55

Issued to LP Engineered Wood Products Ltd.

Rationale for Allowable Annual Cut (AAC) Determination

Effective April 18, 2001

Ken Baker
Deputy Chief Forester

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 55. This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TFL

TFL 55, held by LP Engineered Wood Products Ltd. ('the licensee'), is situated in the Selkirk Mountains north of Revelstoke, and is bounded by the Goldstream River, Mica Creek and the Revelstoke Reservoir. The TFL is within the British Columbia Forest Service (BCFS) Nelson Forest Region and is administered from the Columbia Forest District office in Revelstoke. Adjacent to the TFL are the Revelstoke and Golden timber supply areas (TSAs), as well as TFL 56.

TFL 55 covers approximately 92 700 hectares and lies in rugged terrain characterized by sharp peaks, glaciers and deep narrow forested valleys. Approximately one-half of the TFL is considered productive forest. The three biogeoclimatic zones found in the TFL, which lies in the interior wet belt portion of the province, are Engelmann Spruce Subalpine Fir (ESSF), Interior Cedar Hemlock (ICH) and Alpine Tundra. The lower elevation forests are primarily composed of western redcedar, western hemlock and Douglas-fir, whereas higher elevation forests are predominantly spruce and subalpine fir (balsam). Wildlife species are abundant, including many small mammal species, birds, fish and large mammals such as bear, caribou, moose and deer.

The timber harvested from TFL 55 supplies local mills at Malakwa and Golden.

History of the AAC

Prior to 1992, TFL 55 formed part of the separate, northern block of TFL 23, a large licence extending south into the Arrow Forest District and held by Westshore Terminals Ltd. In 1992, TFL 23 was subdivided, and the northern block was renamed TFL 55. It remained with Westshore Terminals Ltd. An AAC of 220 000 cubic metres was approved in 1992 for the new TFL 55.

In 1993, Westshore divested itself entirely of its former holdings and TFL 55 was subdivided into two roughly equivalent areas: the northern portion remained as TFL 55 and was assigned to Evans Forest Products Ltd. while the southern portion became TFL 56. The former AAC of 220 000 cubic metres was divided equally between the two licences, with the AAC of TFL 55 set at 110 000 cubic metres.

A new AAC for TFL 55 was set at 100 000 cubic metres, effective May 1, 1996. The AAC included a partition of 10 000 cubic metres attributable to timber classified at that time as inoperable (i.e., in stands outside the 1994 operable cut line).

In 1999, the TFL was reassigned to Louisiana Pacific Canada Engineered Wood Products Ltd.

The corporation changed its name to LP Engineered Wood Products Ltd. in November 2000.

New AAC determination

Effective April 18, 2001, the new AAC for TFL 55 will be 90 000 cubic metres, a reduction of 10 percent from the current AAC.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for TFL 55 include the following:

- *Statement of Management Objectives, Options and Procedures (SMOOP) for Management Plan (MP) No. 3,* Selkirk Tree Farm Licence 55, accepted February 1, 2000;
- *Revised Information Package*: *Selkirk Tree Farm Licence 55*, Management Plan No. 3, Louisiana-Pacific Canada Engineered Wood Products Ltd., accepted July 14, 2000;
- Existing stand yield tables for Selkirk TFL 55, accepted by BCFS Resources Inventory Branch, March 27, 2000;
- Managed stand yield tables and site index curves, accepted by BCFS Research Branch, January 31, 2001;
- *TFL 55 Inventory Audit*, BCFS Resources Inventory Branch, January 1999;
- *Timber Supply Analysis: Selkirk Tree Farm Licence 55*, Management Plan No. 3, Louisiana-Pacific Canada Engineered Wood Products Ltd., accepted March 30, 2001;
- *Management Plan No. 3: TFL 55*, Louisiana-Pacific Canada Engineered Wood Products Ltd., draft submitted October 31, 2000; proposed submitted April 2001;
- *TFL 55, Twenty-Year Plan*, Louisiana-Pacific Canada Engineered Wood Products Ltd., accepted February 15, 2001;
- Summary of public input solicited by the licensee regarding the contents of Management Plan No. 3;
- *Landscape Unit Planning Guide,* Province of British Columbia (B.C.), March 1999;
- *Higher Level Plans: Policy and Procedures,* BCFS and Ministry of Environment, Lands and Parks (MELP), December 1996;
- Technical review and evaluation of current operating conditions on TFL 55 through comprehensive discussions with BCFS and MELP staff, notably at the AAC determination meeting held in Victoria on February 6, 2001;
- Revelstoke and Area Land Use Planning, Minister's Advisory Committee – Final Recommendations, October 1999;
- Letter from the Chief Forester to Evans Forest Products Ltd. regarding the TFL 55 forest

cover inventory, dated February 21, 2000;

- Letter from Timber Supply Branch to Sterling Wood Group Inc. and Evans Forest Products Ltd. regarding consideration of the Revelstoke and Area Land Use Planning Minister's Advisory Committee recommendations in the timber supply analysis base case, dated December 23, 1999;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives with regard to visual resources;
- *Age to Green up Height: Using Regeneration Survey Data,* BCFS, October 2000;
- *Forest Practices Code of British Columbia Act*, consolidated to March 2001;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, current as of March 2001;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for TFL 55, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

In accordance with Section 23(3) of the *Interpretation Act*, the deputy chief forester is expressly authorized to carry out the functions of the chief forester which include those required under Section 8 of the *Forest Act*.

The chief forester has expressed the importance of consistency of judgment in making AAC determinations. I also recognize the need for consistency of approach. I have observed the chief forester during a number of previous AAC determinations and am familiar with the guiding principles that the chief forester has employed in making AAC determinations. I find these principles to be reasonable and appropriate and I have adopted them as described below in making my AAC determination for TFL 55.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. When a large number of determinations are made for many forest management units over extended periods of time, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainty. To make his approach in these matters explicit, the chief forester has compiled a set of guiding principles for AAC determinations. I have reviewed these principles and find them to be reasonable, and thus I have adopted and applied them as deputy chief forester in AAC determinations for TFLs. These principles are set out below. If in some specific circumstance it may be necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge, a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation of current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in

unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Forest Practices Code has been fully implemented since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination the chief forester takes this uncertainty into account to the extent possible in the context of the best available information. In making my determination for TFL 55, as deputy chief forester, I have followed the same approach.

As British Columbia progresses toward completion of strategic land-use plans, the eventual timber supply impacts associated with the land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy (PAS) and the Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be the position of the chief forester that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions that have not yet been taken by government. I consider this approach to be reasonable and appropriate. Like the chief forester, I will therefore not take into account the possible impacts of existing or anticipated recommendations made by such planning processes, nor attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impact in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are no longer considered to be part of the timber harvesting land base or to contribute to the timber supply in AAC determinations.

For the area of TFL 55, government's approval of the Kootenay-Boundary Land Use Plan (KBLUP) in 1995, and decisions on protected areas have clarified many aspects of land and resource use and management. Following the approval of the KBLUP, government appointed a community committee known as the Revelstoke and Area Land Use Planning Minister's Advisory Committee (RMAC). The RMAC was tasked to begin to implement the West Kootenay Land Use Plan (a subset of the Kootenay-Boundary Land Use Plan) for Revelstoke and area (including TFL 55) by developing strategies which address the values identified. The RMAC released the *Revelstoke and Area Land Use Planning Final Recommendations* in October 1999. These recommendations have not yet been accepted by government.

The Kootenay-Boundary Higher Level Plan Order promulgated by Ministers in December, 2000 specifically does not apply to the area covered by the RMAC process.

Forest Renewal BC funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of an AAC determination, like the chief forester, I require sound evidence before accounting for the effects of intensive silviculture on possible timber supply. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, the chief forester should immediately reduce some AACs in the interest of caution. However, any AAC determination made by the chief forester or myself must be the result of applying our individual judgment to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I have made allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I have determined should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 55.

With respect to future treaty decisions, as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result

from decisions that have not yet been taken by government.

Overall, in making this AAC determination, as the deputy chief forester, I am mindful of the chief forester's obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of the chief forester's responsibilities under the *Forest Practices Code of British Columbia Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TFL, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model, a series of timber supply forecasts is produced, reflecting different starting harvest levels, rates of change over time, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TFL is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it. In some cases, an AAC is determined that coincides with the base case starting point. In other cases, an AAC is determined which differs significantly from the modelled starting point.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgment, using current available information about forest management, which may have changed since the original information package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Forest Practices Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgment and

analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgments that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis

The timber supply analysis for TFL 55 was prepared by Sterling Wood Group Inc. on behalf of the licensee. Sterling Wood Group's proprietary model TREEFARM (version 6.6) was used to conduct the analysis. Based on my staff's experience examining results from this model, I am satisfied that it is capable of providing a reasonable projection of timber supply for TFL 55.

The timber supply analysis assumptions incorporated the forest management recommendations arising from the RMAC. I have found this to be a reasonable approach because it is evident that operational planning and statutory approvals have, for several years, unfolded essentially in harmony with the RMAC recommendations. I accept the use of these modelling assumptions in the estimation of available timber supply on TFL 55. My considerations of these assumptions are discussed throughout this document.

In the timber supply analysis, the licensee provided two harvest forecast options in which the same assumptions regarding land base inventory, management practices and timber growth and yield were applied, with the exception of the assumptions regarding site productivity estimates. In the 'Current Management Option', site index adjustments suggested by the Old Growth Site Index (OGSI) projects were applied to stands older than 140 years of age. In the other harvest forecast, entitled the 'MoF Option', these OGSI adjustments were not applied.

Having reviewed the information and the associated uncertainties regarding timber supply on TFL 55, and considering the lack of local site productivity data for the TFL as discussed later under *site productivity*, I have concluded that the 'MoF option' reflects current management practices on TFL 55, and is consistent with current accepted procedures regarding the application of OGSI adjustments. I therefore accept that the 'MoF option' is the most suitable basis from which to assess the timber supply implications of uncertainty in the various factors.

In the base case harvest forecast, the current AAC could not be attained as an initial harvest level without what I consider to be unacceptable disruptions to mid- and long-term timber supply. The base case harvest forecast projected an initial harvest level of 90 000 cubic metres per year for one decade before declining in steps of 10 percent per decade over the next four decades. The harvest forecast then declines a further 1.3 percent to reach the long-term harvest level of 58 260 cubic metres per year in decade six.

In the timber supply analysis, various sensitivity analyses were conducted to assess the potential implications for timber supply arising from uncertainty in data assumptions and estimates. These sensitivity analyses have also assisted me in considering the factors leading to my determination.

As discussed throughout this rationale, and in consideration of the items described above, I am satisfied that the information presented to me provides an adequate basis from which I can assess the timber supply for TFL 55 in this determination.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

The total area of TFL 55, as estimated from the licensee's inventory file, is 92 700 hectares. Approximately 45 400 hectares or 49 percent of this area is classified as productive forest.

As part of the process used to define the timber harvesting land base (i.e., the land base estimated to be biologically and economically available for harvesting), a series of deductions was made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest for ecological or economic reasons. For TFL 55, the deductions result in a timber harvesting land base of 19 783 hectares, or approximately 44 percent of the productive forest land.

My consideration of the deductions applied in the derivation of the timber harvesting land base is presented in the following sections of this rationale.

- non-productive and non-forested reductions

In the timber supply analysis, areas classified as non-forested—for example, alpine, alpine forest, lake, rock, river, swamp or urban areas—as well as areas classified as non-productive forest were excluded from the land base assumed to contribute to timber supply. The total area excluded was 47 300 hectares.

BCFS staff have drawn my attention to two of the categories for exclusion under this factor. I note that approximately 40 hectares classified as Alpine Tundra in the biogeoclimatic ecosystem classification (BEC) mapping information were excluded. District staff suggest that the geographic resolution of the BEC mapping is lower than that of the forest cover inventory. A further 587 hectares identified in the forest cover inventory as 'no timber area' were excluded in the analysis. The status of these untyped areas is also subject to uncertainty, as staff indicate the lack of a forest cover label does not mean the areas are necessarily non-productive land.

In total, these two areas comprise nearly 630 hectares. For the alpine tundra areas, I note that typically the highest resolution mapping is considered the most reliable, and that these areas

could possibly be operable forest. However, for both of the exclusions, there is not sufficient certainty about the forest cover present to justify including portions of the areas in the timber harvesting land base at this time. Given that the area is significant, however, I request that the licensee evaluate the areas excluded under this factor to verify their classification, prior to the next analysis for TFL 55.

I also note that the BCFS Resources Inventory Branch audit discussed under 'Existing Forest Inventory' assessed the non-forest classification in the inventory file for TFL 55, and found that it did not meet provincial standards. This finding further indicates a need to review the non-forested areas as discussed above.

In conclusion, I am satisfied that the exclusions applied in the analysis to account for non-productive and non-forested areas represent the best available information, and that in the absence of any better information, deducting the areas classified as alpine tundra and 'no timber area' was appropriate. I make no adjustments to my determination on this account.

- non-commercial brush

In the derivation of the timber harvesting land base, the licensee excluded 5 hectares classified in the forest cover inventory as occupied by non-commercial brush species.

I have reviewed the information regarding the exclusions applied, and I am satisfied that areas of non-commercial brush were adequately accounted for in the analysis.

- economic and physical operability

Those portions of the TFL which are not physically accessible for harvesting, or which are not expected to be feasible to harvest economically, are categorized as inoperable and are excluded when deriving the timber harvesting land base. Due to the mountainous and rugged terrain prevalent on TFL 55, timber harvesting activity is restricted by operability considerations such as adverse terrain and difficult access.

The previous analysis for TFL 55 used operability assumptions derived from a 1994 Operable Cut Line (OCL), above which the chief forester established a partition of 10 000 cubic metres in his 1996 AAC determination. In the rationale statement for that determination, the chief forester requested that over the term of the management plan the licensee provide 'a revised operability map that reflects current technology, market conditions and biophysical considerations'.

To address this request, the licensee undertook new operability mapping in 1997 and revised it in 1999. The revised mapping describes four operability categories for the TFL: conventional, non-conventional, marginal, and inoperable. The area in the conventional and non-conventional categories was included in the timber harvesting land base assumed in the base case.

The land base in the conventional category is larger than the area so delineated under the 1994 operability mapping, and includes those areas to which the partition was established in the 1996 AAC determination. District staff indicate that the licensee has performed adequately in the

area subject to the partition. My consideration of this is discussed later in this rationale under Partitioned component of the harvest.

District staff have reviewed and accepted the new operability mapping. They have brought two concerns to my attention regarding operability on TFL 55.

The first concern relates to small unmappable pockets of inoperable terrain included in the timber harvesting land base assumed in the base case. Operationally, these areas are typically identified and reserved as wildlife tree patches, and staff believe the areas will never be harvested. Given that the areas operationally contribute to wildlife tree patch requirements, I will discuss my consideration of them later in this rationale under *stand level biodiversity.*

The second concern involves the inclusion in the timber harvesting land base of the area described as non-conventional. Based on a map review and their awareness of the licensee's current performance, district staff do not expect these areas to be economically harvestable. Staff note that the licensee has harvested a very limited area using non-conventional means (helicopter or longline cable systems) on the TFL to date. As a result, the district staff do not believe that adequate performance has been demonstrated on this additional land base. Approximately 574 hectares delineated as non-conventional were included in the timber harvesting land base, and constitute slightly less than 3 percent of the timber harvesting land base. A sensitivity analysis in which the timber supply implications of excluding this area were evaluated indicated that short-term timber supply may decrease by as much as 10 percent compared to the base case projection on this account.

I have considered the information regarding the operability for TFL 55. I am aware that the non-conventional areas in question have only recently been included in the timber harvesting land base, and it is possible that the licensee has not yet had time to demonstrate sufficient performance in these areas. I would expect that performance would be periodic and intermittent, given the relatively small area delineated as non-conventional.

However, I am mindful that district staff have reviewed portions of the area in the field, and state that the majority of the area is not in fact likely to be economically harvestable. In consideration of the information, I conclude that there is a risk that timber supply has been overestimated in the base case as a result of including these areas in the timber harvesting land base. Sensitivity analysis results indicate that the implications of this overestimation to short-term timber supply may be as great as 10 percent. I will discuss this further under 'Reasons for decision'.

If the licensee is able to demonstrate performance in these areas over the term of this determination, then the uncertainty will decrease and the operability information can be refined and reflected in a future determination.

- roads, trails and landings

In the analysis, the licensee excluded a percentage of the productive forest considered available for harvesting to account for loss of productive forest land as a result of the construction of roads, trails and landings. Separate estimates are typically made for existing roads, trails and

landings, and future roads, trails and landings, to reflect both potential changes in road building practices and road network requirements over time, and the access that the existing network of roads will provide for future harvesting operations. Estimates account for the area that is permanently removed from the timber harvesting land base.

1) existing roads, trails and landings

To account for existing roads, trails and landings, several separate reductions were applied in the timber supply analysis. Under *non-productive and non-forested reductions*, the licensee excluded approximately 200 hectares to account for existing classified roads. For unclassified roads, as well as for existing trails and landings, no information specific to the TFL was available. Therefore, the licensee used values from the *1998 Revelstoke TSA Analysis Report* to account for existing unclassified roads, as well as existing trails and landings. A total of 858 hectares were excluded on this account.

District staff have reviewed the reductions applied in the analysis to account for existing roads, trails and landings, and indicate that they adequately represent current conditions on the TFL.

I have reviewed the available information, and am satisfied that the exclusions applied in the analysis adequately account for site productivity losses from existing roads, trails and landings. However, I note that data specific to TFL 55 would provide a more precise accounting for these structures, and request that the licensee collect the necessary data and refine the methodology prior to the next determination for TFL 55.

2) future roads, trails and landings

For future roads, trails and landings, the licensee used a Geographic Information System (GIS) to estimate future access structure requirements of the current forest development plan. The licensee then applied the derived estimate of 6 percent in the timber supply model by reducing the size of each polygon by 6 percent as stands were harvested. The total area excluded from contributing to the timber harvesting land base over the analysis horizon was 769 hectares.

District staff suggest that the estimate of 6 percent may not fully account for expected future productivity losses. However, no better information is available.

Having reviewed the methodology and deductions applied in the analysis, I conclude that the reductions to account for future productivity losses are adequate for this determination. However, I request that the licensee review the data and methodology used to account for this factor, and develop a more definitive approach for the next analysis for TFL 55.

- soil stability

The licensee used terrain stability mapping to estimate the area to exclude because of unstable soils. Terrain stability level 'D' mapping was conducted in 1998 for TFL 55. Based on the mapping, portions of areas delineated as terrain class IV (moderate likelihood of landslide initiation following harvesting or road construction) and terrain class V (very high likelihood of

landslide initiation following harvesting or road construction) were identified and excluded from the timber harvesting land base in the analysis. The licensee assumed that on average, 50 percent of the area of stands associated with terrain class V and 10 percent of the area of stands associated with terrain class IV would be unavailable for timber harvesting. However, the licensee did not provide any data to substantiate the assumed reductions for this factor.

BCFS staff indicate that these percentage reductions used to exclude area with terrain class IV and V classifications appear too low. District staff note that more than 10 percent of the stands on terrain class IV areas are typically unharvestable. In addition, areas delineated through the more detailed 'A' level terrain stability assessments as terrain class V sites are very seldom harvested. . Overall, BCFS staff indicate that the analysis assumed too high a proportion of both moderately and highly sensitive sites would be harvestable.

However, because of the reductions applied to account for other factors in the analysis, the percentages of area classified as terrain class IV and V actually excluded from the timber harvesting land base were 76 and 94 percent respectively.

District staff indicate that terrain stability level A and B mapping is available for the majority of the TFL.

I am aware that in using this approach, the licensee assumed that much of the area believed to be harvestable in spite of unstable soils had in fact been excluded for other reasons. I find this assumption to be arbitrary and questionable, as I would expect unstable areas to be distributed across areas that would otherwise contribute to timber supply as well as those that would not contribute. Nevertheless, I accept the approach used for this determination, given that the majority of the area was in fact excluded, and noting that at the operational planning level, harvesting approval is guided by terrain stability assessments. I am satisfied that terrain stability concerns are adequately addressed for this determination.

I expect that the licensee will ensure that better information is available for the next determination for TFL 55, so that the reductions for this factor better reflect operational constraints.

- avalanche hazard

The rugged terrain of TFL 55 leads to a relatively high avalanche hazard for portions of the land base.

The licensee did not provide any specific accounting for restrictions on harvesting as a result of avalanche hazard in the timber supply analysis.

District staff indicate that the licensee conducts avalanche assessments operationally in areas identified as high hazard. Operational techniques such as leaving higher stump heights during harvesting are used to mitigate the hazard where appropriate. District staff expect that harvesting may be precluded on some small areas of the TFL as a result of requirements to manage for avalanche hazard. However, staff do not know if this would lead to any timber

supply impacts.

I have considered the information regarding avalanche hazard. In the absence of specific information to the contrary, I accept that the analysis assumptions for this factor are appropriate. However, I request that the licensee gather the necessary information to either confirm the assumptions made in the analysis or quantify the impact of avalanche hazard on operations for the next timber supply analysis.

- sites with low timber growing potential

In order to determine the timber harvesting land base, sites with low productivity as a result of inherent site factors such as nutrient availability, exposure or excessive moisture are removed from the productive forest land base.

No data specific to TFL 55 were available on which to base exclusions for sites with low timber growing potential. Therefore, the licensee used assumptions from the *Revelstoke TSA Analysis Report* to derive the area deductions applied in the base case. All stands with site indices of less than 8 metres were excluded from contributing to timber supply, for a total of 121 hectares following previous reductions. District staff indicate that the criteria and deductions applied in the analysis are reasonably reflective of current practice.

I have reviewed the criteria used to define sites with low timber growing potential and discussed the deductions with district staff. I accept that the assumptions applied in the analysis are adequate for this determination.

- deciduous stands

Deciduous species are not currently utilized on TFL 55. In the timber supply analysis, all stands composed predominantly of deciduous species were excluded in the derivation of the timber harvesting land base. The exclusions totalled 164 hectares following previous reductions applied in the analysis.

I have reviewed the information regarding deciduous stands, and I accept that the assumptions applied in the analysis appropriately reflect current practice on TFL 55.

- non-merchantable stands

Non-merchantable stands are stands that may exceed low site criteria, yet are not currently utilized. For the analysis, the licensee used the criteria in the 1998 Revelstoke TSA analysis to define non-merchantable stands, as no information specific to TFL 55 was available.

All stands older than 140 years of age and consisting of pure hemlock, pure balsam or predominantly balsam with no spruce component were excluded in the derivation of the timber harvesting land base. A total of 508 hectares after previous deductions were excluded to account for non-merchantable stand types.

Although data specific to the TFL were not used, district staff indicate that the assumptions in the analysis reasonably reflect current practice, as the excluded stands are rarely harvested on

TFL 55.

I have reviewed the information and for this determination, I accept that the deductions adequately account for non-merchantable stands on TFL 55. However, I request that the licensee further examine the criteria used to identify and exclude non-merchantable stands so that information specific to the TFL may be used for the next determination.

Existing forest inventory

The inventory data used for the timber supply analysis were collected during a forest inventory completed in 1989. For the analysis, the inventory file was updated to December 1998 to account for growth, disturbances such as harvesting and fire, and for silvicultural treatments.

At the time of the previous determination for TFL 55, it was noted that the inventory data for the TFL were collected prior to the subdivision of the much larger TFL 23 area, and many of the original inventory plots were outside the smaller unit's boundaries. Given the associated uncertainty regarding the inventory data, the chief forester in his 1996 determination requested that a comprehensive inventory specific to the TFL land base be completed for use in the preparation of Management Plan No. 3.

An audit of the 1989 inventory was conducted in 1999 by the BCFS Resources Inventory Branch. This audit reviewed:

- the mature component of the inventory, assessing differences between the existing inventory's estimate of mean mature volume per hectare for the TFL and a new estimate obtained from the audit samples;
- the immature component, testing site index assignment; and
- the non-forest component, testing the non-forest classification assignment.

The audit indicated that the inventory's estimate of volume for the mature component of the inventory was statistically acceptable. Based on the results of the audit, the licensee requested that the chief forester's requirement for a reinventory be waived.

In January 2000, the chief forester granted this request, although he indicated that the licensee should 'undertake a thorough assessment of the inventory in conjunction with regional and provincial inventory staff.' He also requested at that time that the licensee include an action plan as part of its management plan, that prioritizes and resolves any outstanding concerns with the inventory. These requirements are to be met over the term of Management Plan No. 3.

The licensee in its management plan indicated that it will participate in the Vegetation Resources Inventory (VRI) update anticipated for the Revelstoke area, should FRBC funding be available. The licensee also indicates that if funding is not approved by May 2003, it will implement the action plan requested by the chief forester so that the updated inventory will provide the basis for the timber supply analysis for Management Plan No. 4.

I acknowledge this commitment from the licensee regarding the inventory for TFL 55.

I have discussed the results of the audit further under *volume estimates for existing stands, site productivity estimates* and *non-productive and non-forested reductions.*

I have considered the information regarding the current forest inventory used in the timber supply analysis, and am satisfied that—subject to the discussion in this rationale—it forms an acceptable basis for this determination.

- age-class structure

Age-class structure data from the inventory file is used in the analysis to project forest stand conditions over time. Assumptions about age classes can impact timber supply at any point in the forecast period since they form the basis against which minimum harvestable ages, green-up requirements and other forest cover constraints are applied.

For TFL 55, the majority of stands on the timber harvesting land base are mature or old growth stands, with 60 percent of stands older than 141 years of age. A further 20 percent of stands are 40 years of age or less, and the remaining 20 percent of stands are between 41 and 140 years of age.

I have reviewed the age class distribution present on TFL 55 and I am not aware of any issues that would impact this determination.

- species profile

Approximately 55 percent of the timber harvesting land base on TFL 55 is dominated by spruce-leading stands, and over a third of these stands are considered immature. Stands of predominantly hemlock and predominantly western redcedar constitute a further 19 percent and 15 percent of the timber harvesting land base respectively.

Approximately 95 percent of mature stands are spruce-, hemlock- or western redcedar-leading stands.

I have reviewed the information regarding species profile and am confident that the timber supply analysis has adequately represented the current species composition on TFL 55.

- volume estimates for existing stands

In the timber supply analysis, existing natural stand volumes were estimated and projected using forest inventory attributes and the Variable Density Yield Prediction (VDYP) model (version 6.4a), developed by the BCFS Resources Inventory Branch. The volumes for existing natural stands in which species and stocking have not been managed—defined in this analysis as those stands 20 years of age and older—were projected using this model. All deciduous volume in existing stands was excluded from the yield tables. Once a stand was harvested for the first time in the modelling, its future growth and yield was projected using estimates from the managed stand yield tables.

The natural stand yield tables were reviewed and accepted by the BCFS Resources Inventory

Branch as appropriate for use in the analysis.

As mentioned under 'Existing forest inventory', the BCFS conducted an audit on the current forest inventory. In the audit, differences between the existing inventory's estimate of mean mature volume per hectare for the TFL and a new estimate obtained from the audit samples were assessed, and no statistically significant differences were found. The results of the audit suggest that the current total volume of existing natural stands greater than 60 years of age used in the timber supply analysis is reliable.

I have reviewed the information regarding existing stand yields and am satisfied that acceptable procedures were used and that the yields projected in the analysis are reflective of current stand conditions on TFL 55, and are appropriate for use in this determination.

Expected rate of growth

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

In general in British Columbia, site indices determined from younger stands (i.e., less than 31 years old), and older stands (i.e., over 140 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the old-growth site index (OGSI) project—suggest that actual site indices may be higher than those indicated by existing provincial inventory data from old growth forests. Studies include those known as 'paired-plot'—where plot samples from an old-growth stand and the adjacent second growth stand are compared—and a provincial veteran tree study. It has been consistently concluded from such studies that site productivity has generally been underestimated; managed forest stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

As no local data were available for TFL 55, the licensee appropriately did not apply OGSI adjustments in the base case. Sensitivity analysis in which broadly based OGSI adjustments were applied to all existing stands 140 years of age and older, indicated that both mid- and long-term timber supply could be greater than projected in the base case on this account.

I have reviewed the information regarding site productivity, and I am satisfied that the licensee appropriately did not include OGSI adjustments in the base case, given the lack of data specific

to the stands on the TFL. However, site productivity for managed stands on TFL 55 will likely be greater than indicated by the site indices currently assigned to the old growth stands. The sensitivity analysis provides me with an assessment of the potential underestimation in mid- to long-term timber supply, which may be as great as 11 percent in the long term. I will take this underestimation into account in this determination, as discussed further under 'Reasons for decision'.

I also note that there are approximately 4200 hectares of stands less than 20 years of age on TFL 55, whose site indices are to a large extent likely also derived from the previously-existing older stands on those sites. The inventory audit suggested that site indices for immature stands were underestimated in the inventory file data. While I note that licensee staff have conducted a preliminary review of the data, I encourage them to continue to refine the site productivity data for young stands on the TFL over the term of this determination. Any additional data can be used for the next analysis for TFL 55.

- volume estimates for managed stands

The Table Interpolation Program for Stand Yields (TIPSY) model, developed by the BCFS Research Branch was used to estimate volumes for managed stands. Managed stands for TFL 55 were defined as all existing stands 20 years of age or less, and all stands regenerated in the future. The managed stand yield tables were reviewed and accepted by Research Branch staff for use in the analysis.

District staff have reviewed and agree with the analysis assumptions regarding the expected yields from managed stands. However, they are concerned about the assumed reliance on natural regeneration, and this is discussed later in this rationale under *regeneration*.

Having discussed the information with BCFS staff, and apart from my considerations of the regeneration assumptions applied in the analysis discussed later in this document, I accept the assumptions regarding volume estimates for managed stands.

- operational adjustment factors

TIPSY projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition in the stand. Certain operational conditions, such as less than ideal tree distribution, small non-productive areas, endemic pests and diseases, or age dependent factors such as decay, waste and breakage may cause yields to be reduced over time. Operational adjustment factors (OAFs) are applied to yields generated using TIPSY to account for losses of timber volume as a result of these operational conditions. OAF 1 can account for factors affecting the yield curve across all ages, such as small stand openings. OAF 2 can account for factors whose impacts tend to increase over time, and whose influence on a stand may often be reduced through management practices, such as pests, disease, decay, waste and breakage.

In the analysis, the licensee applied the standard provincial volume reductions of 15 percent for OAF 1 (accounting for less than ideal tree distribution, small non-productive areas, endemic

pests and disease, and random risk factors such as windthrow), and 5 percent for OAF 2 (accounting for decay, waste and breakage).

District staff indicate that armillaria root disease is present in some stands on TFL 55, but its extent and the severity of its impact have not been quantified. I note that preliminary research elsewhere in the province indicates that the root disease may result in reduced yields for managed stands, beyond what is accounted for in the standard OAF reductions. However, given the lack of information regarding its occurrence on TFL 55, it is not possible to assess the potential timber supply impacts at this time.

I have reviewed the information on operational adjustment factors, and accept that the standard provincial reductions account for the majority of operational conditions on TFL 55. The precise magnitude of actual losses due to the factors underlying OAF values is subject to some uncertainty and requires ongoing investigation and refinement. In any event, I note that any reductions in managed stand yields affect long-term timber supply only, and do not influence the short term. Any additional data that becomes available over time can be incorporated into the next analysis for TFL 55.

For this determination, I accept that the base case assumptions regarding operational adjustment factors were appropriate, and make no adjustments on this account.

- minimum merchantability standards

In timber supply analysis, estimates are made of the earliest age at which a forest stand has reached a harvestable condition or has met minimum merchantability criteria. The assumptions largely affect when second growth stands will be available for harvest in the model. In practice, many forest stands will be harvested at older ages than the age at which they reach minimum merchantability, due to economic considerations and constraints on harvesting which arise from managing for other forest values such as visual quality, wildlife and water quality.

In the timber supply analysis for TFL 55, a stand was required to meet a minimum volume requirement of 250 cubic metres per hectare, and a minimum age requirement of 80 years, in order to be eligible for harvest.

I have reviewed the information regarding minimum harvestable ages. The licensee used a single age criterion, in combination with a single volume criterion for all stands, and I acknowledge that this approach does not necessarily provide a good indication of the age at which a stand is likely to be merchantable. The age criterion applied in the analysis may overly constrain timber supply if it unnecessarily restricts from harvest those stands growing on more productive sites that meet the minimum volume criterion earlier than 80 years of age. However, a volume criterion on its own may also not reflect operational considerations that typically include an evaluation of piece size, minimum diameters and culmination ages.

Sensitivity analysis was conducted to test the impact of adjusting only the minimum age criterion by 10 years. In effect, the eligible age for harvest of analysis units where the minimum volume was attained between 70 and 90 years of age was affected by these changes. Nevertheless, the

sensitivity analysis does show that short-term timber supply is quite sensitive to an increased minimum harvestable age eligibility criterion.

District staff have reviewed the volume criterion used and indicate that it is reflective of minimum volumes required for harvesting in existing stands in current practice. However, they are uncertain if the criterion can be extrapolated to future managed stands.

I have considered the information regarding the minimum harvestable age assumptions applied in the analysis. I note that it is usually difficult to precisely assess future minimum harvestable ages, as the ages are dependent on future technology and market conditions which are difficult to predict. While I accept that the determination of minimum harvestable ages for this determination was adequate, in view of the sensitivity of short-term timber supply to minor adjustments in the minimum harvestable age criterion, I request that the licensee review the methodology and collect the data necessary to more precisely estimate this factor for the next analysis.

- harvest profile/harvest sequencing

In the timber supply analysis, profile targets were set to prioritize harvest. A preferred harvest profile matrix was developed for the model, based on the licensee's past five years of harvesting performance on the TFL. The proportions described in this matrix were used to guide harvest for each analysis unit and age class in the modelling. Where the volume could not be met based on the proportions defined in the matrix, the oldest stands were targetted for harvest, first within each analysis unit, and then from a list of all of the analysis units in order of preference. .

District staff have reviewed the harvest sequencing rules applied in the analysis. They note that in current harvesting, the licensee places greater emphasis on the harvest of western redcedar-leading stands than these stands are represented on the timber harvesting land base. However, they confirm that the preferred harvest profile methodology used in the analysis reasonably describes the proportions of stands targetted in current practice.

I have reviewed the information regarding the profile of stands harvested in current practice. While I am aware that harvest of western redcedar-leading stands is currently over-represented, I note that on average, the percentage of harvest occurring in these stands is not of a magnitude to cause me concern for this determination. If a harvesting trend which is not representative of stands on the timber harvesting land base continues over time, it may give rise to issues for future determinations.

For this determination, I accept that the harvest sequencing modelled in the analysis is reflective of current practice on TFL 55, and make no adjustments in this regard.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

Expected time for forest to be re-established following harvest

- regeneration and regeneration delay

In the timber supply analysis, the licensee assumed that stands on TFL 55 will be regenerated using both natural and artificial means. Between 10 and 55 percent of the stands within each analysis unit were assumed to naturally regenerate, with the balance assumed to be planted. The assumed proportion of natural regeneration was dependent on the dominant species of the existing stand as well as the productivity of the site.

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In timber supply analysis, regeneration delay is used to determine the starting point of tree growth for the yield curves which project stand volumes over time. A regeneration delay of two years for planted sites and four years for naturally regenerated sites was assumed in the analysis.

District staff have reviewed the regeneration assumptions applied in the base case, and indicate that the assumed regeneration delay for planted sites is consistent with current practice. However, they state the other regeneration assumptions do not reflect current practice. In particular, although many planted sites experience ingress of natural stems, the licensee does not rely upon natural regeneration as a regeneration strategy on the TFL. To manage for brush hazard, all harvested sites are planted promptly to full stocking levels.

Timber supply branch staff reviewed the analysis to assess the timber supply implications of assuming a higher reliance on planting than in the base case, in order to reflect current practice. The review indicated that long-term timber supply could be approximately 2 percent greater than the base case projection as a result of adjusting this assumption.

I have reviewed the information regarding the regeneration assumptions, and I accept that the proportion of harvested areas on TFL 55 regenerated through planting has been underestimated in the timber supply analysis. This indicates that long-term timber supply may have been underestimated by 2 percent on account of this factor. I will discuss my considerations of this further under 'Reasons for decision'.

- impediments to prompt regeneration

Impediments to prompt regeneration which are not accounted for in the analysis could increase the uncertainty in the growth and yield assumptions used in the timber supply analysis.

No specific impediments to prompt regeneration were identified for TFL 55. In Management Plan No. 3, the licensee indicates silviculture strategies include ensuring all cutblocks are planted within two to three growing seasons following harvest, and ensuring cutblocks with significant potential brush problems are planted within one growing season following harvest. District staff

confirm that for some sites on TFL 55, aggressive silvicultural management including site preparation, planting and brushing is required, and that this is managed appropriately by the licensee.

Having reviewed the information regarding impediments to prompt regeneration, I am satisfied that there has been appropriate accounting for this factor in the analysis.

- not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those areas where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has yet to be established. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is 'backlog' NSR. All other NSR is considered 'current' NSR.

For the TFL 55 analysis, the licensee used the values of 302 hectares of backlog NSR and 253 hectares of current NSR as described on the inventory file. Both the current and backlog NSR areas were assumed to be regenerated during the first decade of the 250-year forecast period. The areas were distributed to each analysis unit by forest type according to recent harvest patterns.

According to the licensee, the area classified as backlog NSR has since been reduced to 135 hectares.

District staff note that the remaining 135 hectares of backlog NSR on TFL 55 will not likely achieve full stocking as was assumed in the analysis. As a result, the expected yields from these stands may be significantly less than was assumed in the base case. However, as the areas are anticipated to have some level of stocking and therefore volume, and the overall number of hectares is small, using more precise estimates of stocking levels is expected to result in negligible timber supply impacts compared to the base case harvest projection.

I have reviewed the assumptions regarding not-satisfactorily-restocked areas, and am satisfied that I do not need to make any adjustment to my determination because of this factor. However, I request that the licensee examine the remaining backlog NSR areas, and ensure that the management objectives for these areas are clarified for the next determination.

(iii) silvicultural treatments to be applied to the area,

Silvicultural treatments to be applied

- silvicultural systems

On TFL 55, the predominant silvicultural system is clearcutting with reserves, an even aged silvicultural system. Partial cutting systems are rarely applied. According to the licensee, clearcutting with reserves accounts for approximately 90 percent of the volume harvested annually. In its management plan, the licensee indicates a 'diameter-limit cut' selection system

will be employed on approximately 10 percent of the TFL, largely in the Engelmann Spruce Subalpine Fir (ESSF) biogeoclimatic zone.

In the timber supply analysis, all harvesting was modelled through the use of clearcutting silvicultural systems (i.e., removal of all of the volume associated with the area harvested). Other requirements under the Forest Practices Code for riparian reserves and wildlife tree patch areas, as well as forest cover constraints such as green-up and adjacency restrictions were also factored into the analysis and are discussed further under the appropriate sections in this rationale.

District staff indicate that they are not aware of any partial cutting in current practice on TFL 55. They state that the analysis assumptions regarding the use of clearcutting systems are consistent with current practice on the TFL.

I have reviewed the information regarding silvicultural systems, and I am satisfied that the analysis assumptions appropriately reflect the systems currently employed on the TFL. I therefore accept the information for this determination.

I ask, however, that district staff monitor whether or not the licensee employs partial cutting to the extent indicated in the new management plan.

- use of select seed

The Forest Practices Code requires the use of the best genetic quality (seed and vegetative material) source available for regeneration. Select seed produced from seed orchards is the product of B.C.'s forest gene resource management program, which uses traditional tree breeding techniques to select naturally-occurring, well-adapted, healthy and vigorous trees.

No use of select seed on TFL 55 was assumed in the timber supply analysis.

However, a review of sowing request records by timber supply branch staff indicates that the regeneration program has included a significant proportion of select interior spruce seed over the past two years. The average indicated genetic worth of the requested seed was approximately 7 percent, with genetic gains for future seed anticipated to be higher.

Further examination of the regenerating stand yields for spruce-leading stands suggests that they may be underestimated by up to 2.5 percent based on the current level of use and genetic worth for improved seed on the TFL. As a result of this underestimation, the long-term timber supply could be 1-2 percent higher than the level projected in the base case.

Having reviewed the information regarding the use of select seed, and in view of the requirement under the Forest Practices Code that it be used where available, I am satisfied that the use of select seed in the regeneration program on TFL 55 will continue at least at the current level. For this determination, therefore, I will take into account the level of current use, which indicates that the long-term timber supply projected in the base case is likely underestimated by 1-2 percent as a result of this factor on its own. I will discuss my considerations of this further under 'Reasons for decision'.

- incremental silviculture

Incremental silviculture includes activities such as juvenile spacing, pruning and fertilization that are beyond the silviculture activities required to establish a free-growing forest stand.

The licensee identifies no specific plans in its management plan for juvenile spacing, pruning or fertilization of the stands on the TFL. District staff state that the analysis assumptions reflect current practice, as incremental silviculture is not practiced to any extent on TFL 55.

I have reviewed the information and assumptions regarding incremental silviculture and am satisfied that current practice was appropriately reflected in the timber supply analysis. I accept the information as the best available information and suitable for use in this determination.

- commercial thinning

Commercial thinning is a partial cutting silvicultural system in which some volume is removed from an immature stand after components of the stand have reached a merchantable size. The volume removed during the commercial thinning is economically useable and can therefore contribute to timber supply. Commercial thinning activity may not significantly affect total timber supply but can offer increased flexibility for the timing and location of harvest.

No commercial thinning is currently practiced on TFL 55, and none was assumed in the analysis. The licensee indicates that opportunities are very limited due to the age class structure of the stands on the TFL.

I have reviewed the information on commercial thinning and am satisfied that current management was appropriately reflected in the timber supply analysis, and make no adjustments for this determination.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

- utilization standards and compliance

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. In the timber supply analysis, the utilization standards assumed in the base case for all species were a minimum 17.5-centimetre diameter at breast height (dbh) with a 30-centimetre maximum stump height and 10-centimetre minimum top diameter inside bark.

District staff indicate that the minimum top diameter inside bark standard applied in current operations for western redcedar stems greater than 140 years of age is 15-centimetres rather than the 10-centimetre limit assumed in the analysis. However, previous growth and yield analysis has shown that small differences in utilization standards have a negligible impact on volume projections.

District staff also note that the district manager relaxes the standard for maximum stump height to allow for heights up to 1.5 metres to facilitate winter harvesting operations. However, staff note that where this standard is applied, the additional unutilized volume is accounted for in waste surveys and there are no implications for timber supply.

I have reviewed the information regarding utilization standards. Although there is some variation between the standards applied in current operations and those assumed in the analysis, I am satisfied that the differences have no significant implications for timber supply, and make no adjustments for this determination.

- decay, waste and breakage

For managed stand yield curves, as previously discussed (see *volume estimates for managed stands*), the TIPSY model incorporates OAFs that account for anticipated decay, waste and breakage.

For existing stand yield curves, the VDYP model used to project volume incorporates estimates of volume of wood lost to decay, waste and breakage. These estimates of losses have been developed for different areas of the province based on field samples.

Standard procedures were used to develop the decay, waste and breakage factors applied in the analysis for TFL 55.

I have reviewed the information regarding the decay, waste and breakage in existing stands on TFL 55, and am satisfied that the best available information was used. These factors were appropriately accounted for in the analysis, and I accept them as suitable for this determination.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

Current management on TFL 55 includes specific provisions for many resource values, as discussed in the following sections. For the timber supply analysis, five resource emphasis zones—riparian, ungulate winter range, integrated resource management and two caribou zones—were identified. Forest cover requirements were created for these zones to reflect operational management constraints.

No visually sensitive areas or community watersheds exist on TFL 55, and therefore no accounting for these factors was required in the analysis.

- cutblock adjacency/green-up

Specific resource values are managed by limiting the size and shape of cutblocks and maximum disturbances (areas covered by stands of less than a specified height), and prescribing minimum time to green-up. Green-up time refers to the period following harvest necessary for a regenerating stand to attain a specified condition, often expressed in terms of stand height. Objectives for forest cover and cutblock adjacency guide harvesting practices in order to address resource values such as wildlife habitat and visual quality. The adjacency objectives modelled in the analysis address minimum green-up height required before an adjacent area may be harvested, and the maximum area permitted to be covered with stands that are less than the minimum green-up height. Adjacency and green-up requirements provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

For the Columbia Forest District, the district manager has exercised his discretion to require an average green-up height of 2 metres instead of the standard 3 metres described in the Forest Practices Code Operational Planning Regulation.. In the timber supply analysis, the licensee applied a forest cover requirement to represent adjacency constraints in each of the five resource emphasis zones. No more than 25 percent of stands on the timber harvesting land base in each zone was permitted to be less than 2 metres in height at any one time.

District staff confirm that the 2-metre green-up height is consistent with current operational requirements on TFL 55. However, staff suggest that the stand ages corresponding to the 2-metre green-up height may be overestimated. I note that this observation is further substantiated when the ages are compared to those described in the report entitled *Age to Green up Height: Using Regeneration Survey Data.* The variation in green-up ages further suggests that site indices are likely underestimated for managed stands on TFL 55, as discussed under *site productivity.*

However, a sensitivity analysis in which green-up height requirements were reduced by 2 metres—that is, the adjacency requirements were effectively removed—indicates that timber supply is not sensitive to reductions in the requirements for green-up height. As a result, although I am aware that many stands likely achieve green-up earlier than assumed in the analysis, I make no adjustments for this determination.

I encourage the licensee to review the methodology used for deriving green-up ages to obtain a more accurate estimate for the next timber supply analysis.

- recreation resources

TFL 55 has significant recreation resources, and portions of the TFL are used extensively for heli-skiing, hiking and other dispersed backcountry activities. Several lodges in the area serve as centres for helicopter-based recreational activities. Lodge sites were excluded from the

timber harvesting land base through the reductions applied for non-forested and non-productive areas.

A recreation resources inventory was completed for the TFL in 1991 and updated in 1999. No recreation sites exist on TFL 55, although one recreational trail passes through alpine areas.

As a result, other than the exclusion of the lodge sites themselves, no explicit exclusions or constraints were applied in the analysis to account for management for recreational resources.

I acknowledge the licensee's continued commitment in the management plan to cooperate with commercial recreation interests during operational planning. I note that the district staff confirm past performance is consistent with this commitment, including work with operators to ensure timber harvesting activity in specific areas enhances heli-skiing opportunities.

Having reviewed the information regarding recreation resources, I am satisfied that the analysis assumptions appropriately reflect current management for recreation on TFL 55. I therefore accept the information for use in this determination.

- cultural heritage resources

Cultural heritage resources generally include archaeological and traditional use sites. Archaeological sites contain physical evidence of past human activity, whereas traditional use sites may not necessarily contain historical physical evidence but may indicate current use by a First Nation. To help manage for unrecorded archaeological sites, archaeological overview mapping may be conducted to assign high, moderate or low ratings for archaeological potential within an area.

Cultural and heritage values which may be present on TFL 55 are those associated with the activities of First Nations as well as the early exploration and settlement by Europeans. The licensee has not conducted archaeological overview mapping on TFL 55. No archaeological or cultural heritage sites have been identified on TFL 55.

Currently no areas on TFL 55 are specifically identified as requiring protection for cultural heritage resource values. As a result, no explicit accounting for cultural heritage resources was included in the analysis. District staff indicate that the analysis assumptions appropriately reflect current practice.

I have reviewed the information regarding cultural heritage resources, and note the licensee's commitment to manage for these resources at the operational planning level. As sites are identified, the information can be incorporated into future determinations for TFL 55. For this determination, I am satisfied that the analysis assumptions appropriately reflect current practice, and make no adjustments.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting in order to

protect riparian and aquatic habitats. For each stream, lake or wetland, the RRZ and RMZ make up the entire riparian management area. Stream riparian classes are described in the *Riparian Management Area Guidebook* and are determined based on presence of fish, occurrence in a community watershed and average channel width criteria. The stream class is used to estimate the area required to be retained in the RRZ and the area or volume to be retained in the RMZ. Similar criteria are used to classify lakes and wetlands.

Stream inventories for TFL 55 were completed in 1995 and 1996. The inventories provide information on fish distribution, stream habitat and riparian class.

For the timber supply analysis, the licensee used GIS-based techniques to estimate the area of RRZs and RMZs associated with streams, lakes and wetlands on TFL 55. A total of 501 hectares in RRZs and 1730 hectares in RMZs were identified.

One hundred percent of the area in RRZs was excluded from the timber harvesting land base in the analysis. In addition, the licensee applied a forest cover constraint to the entire 'riparian management zone', consisting of the productive forest in the delineated RRZ and RMZ areas. A maximum of 25 percent of stands within the area was allowed to be less than 2 metres in height at one time. While this assumption allows for the entire RMZ area within the timber harvesting land base to eventually be harvested, the forest cover requirement tends to result in a more dispersed harvest pattern. No explicit exclusion of RMZs was made in the analysis.

Both district and MELP staff indicate that the exclusions applied in the analysis reasonably reflect current practice for RRZs. The amount of area retained in RRZs operationally on TFL 55 is consistent with the requirements under the Forest Practices Code.

However, district staff are uncertain as to how the analysis assumptions for RMZs were intended to emulate current practice. Operationally, district staff indicate that RMZs are either entirely reserved, or (less commonly) entirely clearcut depending on variables such as terrain.

Upon review of the information, I agree that it is not clear how the forest cover constraint applied in the analysis to riparian management areas was intended to reflect operational practices on TFL 55. However, I am aware that effectively 54 percent of the area in RMZs was excluded from the timber harvesting land base because of other reductions applied in the analysis for other factors. In addition, overlap exists between riparian zones and ungulate winter range (UWR) areas, particularly for moose. As a result, many riparian areas are further constrained by the forest cover requirements in the UWR zone.

In consideration of the information above, including the exclusions applied for RRZs, the overlap between RMZ areas and exclusions applied for other factors, and the overlap of these areas with UWR, I am satisfied that there has been an adequate accounting for riparian areas in this determination. As a result, I make no adjustments on account of this factor.

However, I request that the licensee review its management practices in RMZs and collect the data necessary to specifically reflect these practices in the next timber supply analysis for TFL 55.

- wildlife habitat

TFL 55 provides habitat for numerous wildlife species, including grizzly and black bear, deer, moose, caribou, mountain goat, wolverine and cougar.

For wildlife species considered to be at risk, the Conservation Data Centre of BC maintains forest district tracking lists. These lists name those species and plant associations considered to be at risk (e.g., endangered, threatened, vulnerable or sensitive) and which are known to occur, strongly expected to occur, or which have occurred in the past within a given forest district. The Identified Wildlife Management Strategy (IWMS) addresses habitat management for specific species considered to be at risk, as described in the next section.

1) identified wildlife

'Identified wildlife' refers to species 'at risk' (red- and blue-listed) and to regionally significant species which may be impacted by forest management activities, and which may not be adequately protected by existing management strategies such as those for biodiversity, riparian management, ungulate winter range or through the application of other forest cover constraints. Species at risk as defined under the Forest Practices Code also include those species that are not considered at risk provincially but which have regional populations that may be threatened. The intent is to address the habitat needs of regionally significant wildlife early on, in order to lessen the chance that they will become listed as threatened or endangered provincially.

Volume I of the IWMS was released in February 1999 and details several species which occur or potentially occur within TFL 55 and which require future consideration when planning timber harvesting activities. These species include the following: northern long-eared myotis, grizzly bear, fisher, wolverine, caribou, mountain goat, american bittern, great blue heron, bald eagle, short-eared owl, northern goshawk and bull trout. Volume II, which has yet to be released, may identify additional species.

While caribou and grizzly bear are listed under the IWMS, provisions for management of their habitat on TFL 55 are separate from the implementation of IWMS, as discussed under *grizzly bear habitat* and *caribou habitat*.

In general, identified wildlife species will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs), or through other management practices specified in higher level plans. Specific WHAs or management strategies for identified wildlife species have not yet been established on TFL 55. As a result, no specific exclusions were applied in the base case.

Government has limited the impact of management for identified wildlife to a maximum of one percent of the short-term harvest level for the province. When WHAs are identified or established, and GWMs are implemented, the impacts on timber supply of management for identified wildlife will be more quantifiable. In addition, measures will be assessed over time to determine if those measures are sufficient to adequately protect the identified wildlife species. The identified wildlife strategy and associated timber supply impact thresholds may be changed

after such an evaluation, but I cannot speculate on the outcome of this process. In addition, I cannot speculate about decisions that may be made during future land and resource management planning processes with respect to identified wildlife. Any future changes to the required measures for identified wildlife species which result in impacts to timber supply, either under the IWMS or according to approved plans, will be incorporated into future determinations.

For this determination, it is not possible to specify the exact location or precise amount of habitat area that will be required within the timber harvesting land base to implement the IWMS. MELP staff indicate that the habitat requirements for many of the identified wildlife species expected to occur on TFL 55 are already accounted for through other constraints applied in the analysis and in practice. The management for most of these species is therefore not expected to result in additional timber supply impacts. Staff believe that of the species listed, only the management requirements for northern goshawk are likely to result in additional timber supply impacts on the TFL. Inventory data for this species is limited at this time.

Given the commitment made by government discussed above, it has been appropriate in the majority of AAC determinations to account for an expected but not fully quantified impact on the timber supply. In consideration of the information regarding identified wildlife, and relative to the base case projection, I believe it appropriate to expect a reduction to timber supply of up to one percent in the mid to long term as a result of the implementation of the IWMS. I will discuss this further under 'Reasons for decision'.

2) caribou habitat

The Revelstoke caribou herd, totalling approximately 400 animals, range through the forests north of Revelstoke. Critical caribou habitats, including portions of TFL 55, have been identified and mapped by MELP, BCFS and Parks Canada staff through the use of radio telemetry, aerial censuses, terrain analysis and specific sitings.

As explained elsewhere in this document, current management is essentially in harmony with strategies recommended by the RMAC, including measures to protect the caribou herd. The RMAC strategies include retaining old forest to provide for critical mountain caribou habitat, including minimum forest cover requirements within the ESSF and ICH biogeoclimatic zones below the 1994 OCL, as well as within the ESSF areas located between the 1994 OCL and the ESSF parkland.

This information guides current operational practices in the Columbia Forest District. In Management Plan No. 3, the licensee commits to 'incorporate MAC caribou and ungulate winter range habitat guidelines into operational plans'.

To model the requirements of current practice, the licensee delineated two separate zones for caribou in the analysis, covering a total of 12 373 hectares or 60 percent of timber harvesting land base. In the model, in the 'caribou ESSF' and 'caribou ICH' zones, a minimum of 40 percent of the stands on the operable forested land base were required to be greater than 140 years of age at all times during the forecast period, and a minimum of 10 percent of the

stands on the same area were required to be greater than 250 years of age. In addition, for the 'ESSF area' between the 1994 OCL and ESSF parkland, in order to reflect interim guidelines currently guiding timber harvesting in those areas, a constraint was applied in the model requiring at least 70 percent of the stands to be at least 140 years of age

As described under *cutblock adjacency/green up*, a forest cover constraint whereby no more than 25 percent of stands on the timber harvesting land base in each of the zones could be less than 2 metres in height at any one time was also applied to the caribou zones.

District and MELP staff confirm that the analysis assumptions for caribou habitat reasonably reflect current management. MELP staff note that for the ESSF areas between the OCL and the ESSF parkland, the forest cover constraint is measured in current management only on slopes of less than 80 percent. However, the licensee did not have explicit slope information in its forest cover file to model this constraint. Given the requirements for the species, district staff expect that there are limited areas with greater than 80 percent slope in the caribou habitat in the ESSF zone.

In consideration of this small discrepancy between practice and what was modelled, I conclude that the implications for timber supply of including the greater slope areas to meet the minimum forest cover constraint are so small as to be negligible, and make no adjustment on this account. Having reviewed the information regarding caribou habitat, I am mindful of the licensee's commitment in its management plan to incorporate RMAC caribou guidelines into its operational plans. Overall, I am satisfied that the assumptions applied in the analysis to account for the management of caribou habitat reflect current practice, and are based on the best available information for this determination.

3) ungulate winter range

Ungulate species on TFL 55 include deer and moose. Specific portions of TFL 55 have been mapped as ungulate winter range (UWR) but the district manager has not yet formally established these areas under the Forest Practices Code. All ungulate winter ranges are to be formally established, either through a higher level plan or under the Operational Planning Regulation, prior to October 2003.

In the interim, where ungulate winter ranges have not yet been established but were mapped prior to 1998, government policy allows for the inclusion of the draft ranges in timber supply analysis, in order to ensure habitat needs for ungulates are appropriately accounted for during timber supply reviews.

Recommended management strategies for these areas were included under the RMAC strategy. The district manager has determined that the management recommendations for UWR contained in the draft RMAC strategy represent the most up-to-date and current guidance for the management of ungulates in the Revelstoke area. Recommended management provisions vary by biogeoclimatic subzone and variant and by priority wildlife species. The licensee commits in Management Plan No. 3 to 'incorporate MAC caribou and ungulate winter range habitat guidelines into operational plans'.

To reflect management requirements in UWR areas, a forest cover constraint was applied in the analysis to the entire operable forested area delineated as UWR. In this area, at least 34 percent of the stands was required to be 100 years of age or older at all times. The total timber harvesting land base within the UWR is estimated at 2325 hectares.

MELP and district staff have reviewed the assumptions applied in the analysis to reflect management provisions for ungulates, and confirm that the forest cover requirements reflect those guiding operational practices. However, MELP staff reviewed the assumed area of UWR in the analysis, and note that approximately 645 hectares of productive forest in the French Creek drainage that is no longer considered to be UWR was modelled as UWR. As a result, the forest cover constraint was applied to a larger area than is managed as UWR in current practice.

Although this might appear to indicate timber supply has been underestimated on this account, district staff indicate that harvesting is unlikely to be *less constrained* as a result of excluding the French Creek area, due to the age class distribution and harvesting history on the remaining UWR area. MELP staff indicate that past harvesting on the currently recognized area of UWR has been more extensive than in the French Creek drainage. Therefore, application of the constraint to a smaller, more heavily disturbed land base is more likely to result in greater operational planning constraints on the remaining UWR.

However, I am aware that the twenty-year plan also included modelling of the larger UWR area, as discussed under *twenty-year plan*. Investigation of the impacts to the planned harvest depicted in the plan of removing the French Creek drainage from the UWR area, indicated that the planned harvesting activities were unaffected and the forest cover constraints were not compromised. This indicates that the short-term harvest level in the base case can likely still be maintained with the changed UWR area.

Having reviewed the information regarding ungulate winter range, I note the following. I am satisfied that the forest cover constraints modelled in the analysis are reflective of the constraints governing current management for UWR areas on TFL 55, and of the licensee's commitment in its management plan to incorporate ungulate winter range guidelines into its operational plans. With respect to the difference in area to which UWR constraints were applied, I am satisfied, as discussed above, that short-term timber supply is likely not affected by removal of the French Creek drainage from the UWR.

I am mindful that there is still some uncertainty regarding possible longer term timber supply impacts resulting from the change in area. However, I find it likely that the relaxation of the constraint on harvesting in the French Creek drainage will counter-balance any greater restrictions on harvesting in the current UWR areas in the mid to long term as a result of meeting the constraint on a smaller area. I therefore make no adjustments at this time.

I note that as ungulate winter ranges are finalized, any better information that becomes available can be incorporated into the next analysis for TFL 55.

4) grizzly bear habitat

Grizzly bears are present on TFL 55. Although identified as a species under the IWMS, the management requirements for grizzly bear are generally accounted for separately from the IWMS implementation.

The 1995 Kootenay Boundary Land Use Plan (KBLUP) contained recommendations for the management of grizzly bear habitat. The provisions include management of habitat adjacent to avalanche tracks and management of road access and densities in critical drainages. The RMAC strategy also recommends maintenance of forest cover on one side of avalanche tracks, and describes provisions for access management in habitat areas. The district manager has requested consideration of the recommendations in operational planning .

The licensee did not apply any specific constraints in the analysis to account for the management of grizzly bear habitat.

MELP staff are satisfied that the management of grizzly bear habitat is appropriately accommodated in the analysis. MELP and district staff indicate that management provisions for grizzly bear habitat are expected to be accommodated through the assignment of biodiversity emphasis options and the specified old and mature forest retention targets through the landscape unit planning process. As a result, no additional timber supply impacts are anticipated to result from grizzly bear management provisions.

I have reviewed the information regarding grizzly bear habitat on TFL 55. For this determination, I am satisfied that the reflection in the analysis of the management requirements for landscape level biodiversity (as discussed under *landscape level biodiversity*), to the extent that they reflect current approved management practice, should also provide for grizzly bear habitat. As a result, I find that the assumptions in the analysis regarding grizzly bear habitat were appropriate, and I make no adjustments for this determination.

As landscape unit planning continues, if new information indicates that more explicit accounting for grizzly bear habitat is required, it can be reflected in a future analysis.

- stand-level biodiversity

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code, biodiversity in a given management unit is assessed and managed at both the stand and landscape levels.

Stand-level biodiversity management includes retaining wildlife tree patches (WTPs), within or adjacent to cutblocks to provide structural diversity and wildlife habitat. The *Biodiversity Guidebook* made recommendations for percentages of area to be retained in WTPs, based on specific assumptions about the land base. *The Landscape Unit Planning Guide* reflects the principles described in the *Biodiversity Guidebook*, and describes the policy on the implementation of biodiversity management.

The licensee used the draft landscape unit boundaries and recommended BEOs from the RMAC strategy in the base case, and used table A3.1 in the *Landscape Unit Planning Guide* to determine retention rates for WTPs. Riparian reserve areas and areas excluded from the timber harvesting land base for other reasons also contribute to stand level biodiversity requirements. The licensee calculated the amount of additional area necessary to meet the requirement, and excluded 386 additional hectares from the timber harvesting land base in the analysis to account for wildlife tree retention requirements.

MELP and district staff confirm that the methodology used in the analysis is consistent with provincial policy. However, as mentioned under *economic and physical operability*, district staff suggest that more area is operationally retained and classified as wildlife tree patches than assumed in the analysis. WTPs identified in operational plans include small pockets of forest considered by district staff to be unharvestable because of poor deflection, unstable soils, wet soils, or rock bluffs. Uncertainty exists around the degree of overlap of these areas with other factors, as some of these additional areas are likely accounted for in the analysis through exclusions or constraints applied for non-productive areas, unstable soils, low sites and riparian areas. District staff suspect that overall, actual WTP retention percentages may be higher than required by provincial policy and higher than what was reflected in the base case of the timber supply analysis.

I have reviewed the information on stand-level biodiversity, and I am satisfied that the assumptions in the analysis are consistent with provincial policy requirements. With respect to the additional, unquantified area classified as wildlife tree patches, there is insufficient evidence for me to take into account any timber supply implications at this time, and therefore I accept the assumptions in the analysis and make no adjustments.

However, in consideration of the district's concern, I recommend that the licensee review this issue and provide the district manager with a full accounting of WTP areas prior to the next AAC determination.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species that are dependent on or are strongly associated with old-growth forests. Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices is needed to represent the different natural disturbance patterns under which ecosystems have evolved.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. A landscape unit is an area established by the district manager, generally up to 100 000 hectares in size, based on topographic or geographic features such as a watershed, or series of watersheds, to manage biodiversity and other forest resource values.

TFL 55 falls within three separate landscape units. For the timber supply analysis, the landscape-level biodiversity requirements were assumed to be met solely within the boundaries of the TFL.

The *Biodiversity Guidebook*, the *Landscape Unit Planning Guide* and *Higher Level Plans: Policy and Procedures* all provide policy and guidance on management for landscape-level biodiversity. The *Landscape Unit Planning Guide* provides guidance on which components of the full range of recommendations included in the *Biodiversity Guidebook* should be implemented to achieve a balance of forest management objectives. The *Landscape Unit Planning Guide* contains forest cover requirements for old seral forest that are to be applied at the biogeoclimatic variant level within each landscape unit. The requirements are stated as a minimum percentage of the productive forest to be retained in stands above a specified age that varies by ecosystem type. The guide also allows the old-seral requirement to be phased in over time in landscape units with a lower biodiversity emphasis.

The 1996 Higher Level Plans: Policy and Procedures guide provides further policy guidance. It outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—that may be employed when establishing biodiversity management objectives for a landscape unit. To achieve a balance between biodiversity and timber supply objectives, this guide recommends the application of a mix of BEOs in each subregional planning area. The proportions of a planning area subject to lower and intermediate biodiversity emphasis should range from 30 to 55 percent, with the average at approximately 45 percent of the area subject to lower, 45 percent to intermediate, and 10 percent to a higher BEO.

The draft RMAC strategy contains recommendations for biodiversity that vary slightly in some respects from the provincial approach. The strategy describes a set of principles for general biodiversity management tailored to the Revelstoke area, including consideration of connectivity corridors, proportional representation, recommended BEOs and seral targets, as well as recommended management practices to meet biodiversity objectives. Recommended BEOs were delineated along regional connectivity corridors. To minimize impacts to timber supply while still providing for biodiversity values, high and intermediate BEOs for the area were assigned to overlap as much as possible with the management requirements for mountain caribou, ungulates and riparian values. In conjunction with these objectives, seral stage requirements were met proportionally from the total forested land base and the operable land base. Old seral requirements for low BEO areas were permitted to be phased in over three rotations. The RMAC strategy also endorsed the application of patch size variance to enhance resource values, and recommended a 2-metre green-up height.

The biodiversity recommendations, including the draft landscape unit boundaries and the recommended BEOs from the draft RMAC strategy were modelled in the base case. Within TFL 55, only areas with low and intermediate BEOs have been identified under the RMAC. The RMAC strategy provisions that recommend that old seral requirements be met immediately in high and intermediate BEO areas, but allow the requirement for areas with low BEOs to be met within three rotations were modelled (these provisions are consistent with the *Landscape Unit Planning Guide).* No mature seral objectives are set for low BEO areas under the

RMAC, and none were modelled in the analysis.

District staff have reviewed the analysis assumptions for landscape-level biodiversity, and state that the assumptions are consistent with the guidelines applied for biodiversity during approval of operational plans. The district manager has requested that licensees consider the RMAC recommendations for biodiversity in the preparation of forest development plans.

As discussed elsewhere in this document, at the time of this determination the RMAC recommendations have not yet been formally accepted by government. However, given the statutory decision maker's ongoing approval of operational plans based on the recommended BEOs from the RMAC strategy, these BEOs were modelled in the base case.

A sensitivity analysis in which the standard weighted distribution of 45-45-10 was applied showed no impact to short- or mid-term timber supply as compared to the base case projections, and only a 0.1 percent increase in long-term timber supply. However, both this sensitivity analysis and the base case were modelled with an assumption that seral stage objectives would be met proportionally from the total forested and operable land bases. The draft RMAC strategy recommendations include the application of a 'proportional' approach; for example, if the landscape level biodiversity constraint requires that 19 percent of a variant be maintained as old growth, then using the 'proportional' approach, 19 percent of the operable land base and 19 percent of the forested land base must be maintained as old growth. I am aware that this direction is inconsistent with the typical approach taken elsewhere in the province and as described in current policy, whereby forest cover requirements for old-seral stage biodiversity guidelines are assumed to be met first, and to the extent possible, from non-contributing forests. No sensitivity analyses were conducted to assess the implications for timber supply if this standard provincial approach were used in place of assumed proportional representation.

However, I am mindful that the statutory decision makers have approved and apparently continue to approve operational plans based on the complete 'package' of draft recommendations from the RMAC, including the non-standard application of proportionality described above. As such, I am satisfied that the inclusion of proportional representation is consistent with currently approved practice in the Revelstoke area, including TFL 55. Should the direction on this matter for the Revelstoke area change in the future, either in a higher level plan or through further policy guidance, then such a change can be reflected in a future analysis.

For this determination, I make no adjustments.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Other information

- operational plans

The licensee annually prepares a forest development plan (FDP) which presents a timber harvesting and forest development strategy for the upcoming period.

District staff indicate that the licensee has had no difficulty identifying sufficient operating areas for the future. In the FDP, the licensee currently has identified approximately 10 years worth of harvestable volume at the current AAC in approved category A cutblocks.

I have reviewed the information regarding operational plans and I am aware that the licensee has been able to locate and obtain approval for the eventual harvest of a significant amount of timber under the requirements currently guiding operational plan approvals in the Revelstoke area, which includes consideration of the recommendations arising from the RMAC strategy. This provides me with some indication of the impact of the implementation of the RMAC recommendations on the current operations for TFL 55. Further, even with the RMAC recommendations guiding current operations, ten years of harvest at the current AAC of 100 000 cubic metres can be achieved. However, without further analysis, this information on its own is only of limited value in that it provides no indication of future operational constraints that may arise from implementation of the RMAC recommendations.

I have considered this information in my determination, as discussed under 'Reasons for decision'.

- twenty-year plan

The licensee used the proprietary spatial harvesting model 'Patterns for Resource Integration and Spatial Management' to develop a twenty-year plan for TFL 55. The twenty-year plan incorporated blocks from the current five-year FDP. Additional blocks for the remainder of the period were generated based on the same management assumptions as modelled in the base case.

The management constraints used for the modelling of the twenty-year plan included the larger area to which ungulate winter range requirements were inadvertently applied, as discussed under *ungulate winter range*. Timber supply branch staff and the licensee investigated the implications to the twenty-year plan of correcting this assumption. The investigation determined that the plan would still be operationally obtainable without compromising the forest cover requirements on the corrected UWR.

The district manager accepted the licensee's twenty-year plan on February 15, 2001.

The twenty-year plan suggests that the first two decades of the base case harvest projection is operationally attainable. I have been mindful of this information in my consideration of an appropriate harvest level for TFL 55.

- Revelstoke and Area Land Use Planning Minister's Advisory Committee

Strategic land use plans establish the broader context for operational plans by providing objectives for managing forest resources in a given area. There are several types of planning processes that are described as strategic in contrast to operational planning processes. Distinctions are made between higher level plans as defined by the Forest Practices Code and strategic land-use planning processes such as regional or subregional planning (land and resource management planning).

Portions of strategic land use plans may be declared as higher level plans under the Forest Practices Code. A higher level plan defined under the Forest Practices Code makes specific objectives or constraints mandatory, thereby setting the resource management context for developing subsequent operational plans.

The Kootenay Boundary Land Use Plan (KBLUP), a regional planning process, was approved by government in 1995. The people of the Revelstoke area were concerned about the possible impacts to their community arising from the KBLUP, and requested a process to develop their own recommendations to balance the economic, environmental and social needs of the community and the province, and mitigate impacts where possible. Subsequently, government established the Revelstoke and Area Land Use Planning Minister's Advisory Committee (RMAC) to provide advice to the Minister of Forests on the implementation of the KBLUP in the Revelstoke area. The principal task for the committee was to develop recommendations that as much as possible met the goal discussed above.

The final recommendations of the RMAC were submitted to the Minister of Forests in October 1999. The recommendations are currently under review by the Minister. Some of the recommendations may ultimately be accepted and reflected in a higher level plan order. Although the RMAC strategy is not binding on anyone, current management for TFL 55 and the surrounding area is generally in accordance with the RMAC strategies.

For the area of TFL 55, the primary areas in which the RMAC recommendations differ from standard Forest Practices Code provisions are in the objectives, strategies and practices to provide for biodiversity and caribou. These recommendations were reflected in the timber supply analysis for TFL 55, as discussed under the relevant sections of this rationale.

I am aware that the RMAC recommendations have not yet been formally accepted by government nor included in a higher level plan. However, I am aware that the RMAC was a detailed, community-based process involving many stakeholders in the Revelstoke area, and the recommendations represent a consensus reached by the participants. Indeed, the RMAC process entailed extensive discussion within the community, involving a broad cross-section of stakeholders, and substantial and high quality analytical support. As described under local objectives, the Minister requested in his letter of July 28, 1994, that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. In consideration of this request, I am satisfied that the recommendations arising from the RMAC represent an important statement of local objectives for the Revelstoke area.

I am also mindful that in the Revelstoke area, the recommendations arising from the RMAC have been implemented for some time, and the associated implications for land base available for timber harvesting and forest management practices are well understood. I am aware that the licensee, MELP and BCFS staff work together on matters concerning TFL 55 and apply the RMAC recommendations to guide current operational planning and practices for biodiversity, cutblock adjacency and green-up, and caribou habitat. The district manager has considered many of the RMAC recommendations to provide the best available information for management

of resources, and has requested that the recommendations be considered in operational planning by the licensee. More specifically, it is evident that operational plans are now prepared and approved in harmony with the RMAC recommendations.

I am also aware, as discussed under operational plans, that the licensee currently has over 10 years of volume at the current AAC in approved cutblocks on TFL 55. These blocks were approved on the basis of a management regime that reflects the RMAC recommendations. The large volume in category A cutblocks indicates to me that this management regime is implementable in at least the short term on TFL 55.

In consideration of this information, I am satisfied that the provisions arising from RMAC represent a stable management regime which guides current practice on TFL 55, and which is accepted and applied by the parties involved. As a result, although I cannot be certain of the eventual decision of government on the recommendations from the RMAC, I am satisfied that the timber supply analysis reflects current approved practices, that in turn reflect the agreement of local stakeholders on management objectives and forest practices.

I also note that, as the recommendations arising from the RMAC strategy are presented to government for approval, if they are modified to an extent that they change operational practices from those currently being implemented on TFL 55, then I am prepared to revisit my assessment in the future. As discussed in my guiding principles, I attempt to reflect as closely as possible forest management factors that are a reasonable extrapolation from current approved practices. As new or better information becomes available, it can be considered in future determinations for this TFL.

As a result of the considerations discussed above, I accept the analysis assumptions regarding the RMAC recommendations, with the exception of the specific considerations discussed in this rationale document.

- First Nations considerations

No First Nations communities exist in the vicinity of TFL 55. The Ktunaxa-Kinbasket, Shuswap and Okanagan Nations have asserted traditional territories within the area of TFL 55. I acknowledge that the Ktunaxa-Kinbasket Tribal Council, on behalf of the Ktunaxa Nation, has submitted to the provincial government a comprehensive land claim covering the south-east corner of the province, including part of TFL 55. The Shuswap Nation Tribal Council, although not participating in the formal treaty process, has stated its interest in taking part in some form of negotiation with the provincial government regarding its asserted traditional territory.

As discussed under my 'Guiding Principles', it is inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government. As decisions on treaty negotiations are undertaken by government, they will be reflected in future timber supply analyses for the TFL.

(b) the short and long-term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative rates of harvest

- harvest flow/socio-economic implications

The nature of the transition from harvesting old growth forests to harvesting second growth forests is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large timber volumes in older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

The licensee for TFL 55 provided one alternative harvest flow in the timber supply analysis, in which the same assumptions were applied as in the licensee's 'current management option' discussed under Timber Supply Analysis. In the alternative, the licensee attempted to set an initial harvest level at the current AAC. The short-term harvest level of 100 000 cubic metres per year was achieved for one decade followed by 10 percent reductions for the next three decades, and then a 28 percent reduction in decade four. The mid-term harvest level of 52 755 cubic metres per year was lower than that projected in the base case.

I note that this alternative harvest forecast used different analysis assumptions for site productivity than did the base case harvest forecast, and as a result likely slightly overestimates mid- to long-term timber supply. However, the alternative does provide me with an assessment of the mid-term timber supply implications of attempting to meet the current AAC as an initial harvest level on TFL 55.

Review of the alternative harvest flow confirms for me that the base case harvest forecast with its gradual reductions to lower mid- and long-term harvest levels, provides the most suitable projection of timber supply for this determination.

- community dependence on the forest industry

Forest-based employment is a significant component of the economy of Revelstoke and the surrounding area. According to statistics documented in the RMAC strategy, forestry activities contribute approximately 24 percent of the employment in the Revelstoke area, and 22 percent of total after-tax basic income.

The licensee employs approximately 540 people in local woodlands operations and associated manufacturing. Approximately 320 people are associated with the licensee's Golden plant and

another 220 with the Malawka operations, including milling, logging, hauling, construction, forest management and silviculture employees and consultants. The harvest from TFL 55 contributes a substantial proportion to these operations.

I have reviewed the information regarding the community dependence on the forest industry and conclude that the timber harvested on TFL 55 contributes significantly to the licensee's local operations and to employment in the region.

- difference between AAC and actual harvest

As a normal standard, most licencees have some flexibility in their annual rate of cut during a five-year period referred to as the cut control period. The volume harvested must be within 50 percent of the allowable annual volume in each year (annual cut control), and also within 10 percent of the allowable volume for the five-year period (periodic cut control).

I note that the licensee has met its cut control requirements on TFL 55 over the last full cut control period, and is expected to meet the requirements when the current period is complete. I am satisfied from review of the information that there are no issues relating to the ability of the licensee to conduct operations on the TFL.

Partitioned component of the harvest

The previous AAC determination included a partition of 10 000 cubic metres, or 10 percent of the total AAC, to areas above the 1994 operability line.

District staff confirm that the licensee's performance in the partitioned area over the current five-year cut control period is satisfactory. Staff project that the licensee's performance in the partition will be 261 percent over the five year period, which ends May 1, 2001.

I have reviewed the information about the licensee's performance in the 1996 partition. Given the information regarding the licensee's satisfactory performance in the partition, the changes in the conventionally operable land base as discussed under *economic and physical operability*, and the demonstrated ability of the licensee to meet its cut control obligations, I am satisfied that a partition is no longer required. I will discuss this further under 'Reasons for decision'.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

- existing mills

The licensee is a major employer in the Revelstoke area, with a sawmill in Malakwa, and laminated veneer lumber, plywood and veneer plants in Golden. TFL 55 supplies about 8 percent of the log requirements for the sawmill directly, and another 17 percent indirectly through log trades. The TFL contributes about 5 percent of the log requirements of the Golden plant.

The timber supply from TFL 55 contributes significantly to the mill requirements of the licensee's local operations, and also to employment in the region, as also noted under *community dependence on the forest industry*.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia;

Economic and social objectives

- Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). These economic and social objectives are an important consideration in my determination of an AAC for TFL 55.

This letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

I have considered the contents of the letter and memorandum in my determination of an AAC for TFL 55. As discussed earlier under *incremental silviculture*, I concluded that the opportunities for commercial thinning are currently limited on the TFL. In addition, as discussed earlier under *economic and physical operability*, I am satisfied that there are no further significant opportunities at this time for harvesting in previously uneconomical areas, beyond what was incorporated into the base case assumptions. As discussed under Partitioned component of the harvest, based on the licensee's performance over the term of Management Plan No. 2, I concluded that the 1996 partition is no longer required.

The Minister's memorandum addressed the effects of visual resource management on timber supply. In it, the Minister asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. TFL 55 does not contain any visually sensitive areas.

- local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

As discussed under *Revelstoke Minister's Advisory Committee*, I accept that the recommendations arising from the RMAC strategy provide an expression of local objectives for the Revelstoke area.

The licensee indicates in Management Plan No. 3 that it actively solicited input on the statement of management objectives, options and procedures (SMOOP) and the draft management plan. District staff confirm that the licensee met its public input obligations satisfactorily, and that no written responses were received.

I am satisfied that the licensee has carried out its public involvement obligations satisfactorily, and that no specific issues were identified in public review which would impact this determination.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Abnormal infestations and salvage

- unsalvaged losses and salvage program

Numerous parasites, fungi or plants can kill trees or degrade the quality and value of logs. Unsalvaged losses are timber volumes destroyed or damaged by causes such as fire and disease that are not recovered through salvage operations.

Estimates for unsalvaged losses account for epidemic infestations that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are accounted for in inventory sampling for existing timber yield estimation or though other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted previously in this rationale.

For the timber supply analysis, the licensee used a combination of historical data for the TFL and data from the adjacent Revelstoke TSA. Fire losses were calculated using data from regional fire reporting and a review of large fires. Average windthrow losses were calculated by reviewing losses during the past ten years and through comparisons with the figures used in the timber supply review for the Revelstoke TSA. Losses as a result of hemlock looper, Douglas-fir and spruce bark beetles were calculated using Forest and Insect Disease survey data and data from the TSA. Avalanche losses were assumed to occur infrequently and, for the most part were assumed to be salvaged.

In total, the licensee excluded 990 cubic metres per year from the projected harvest volume to account for unsalvaged losses. District staff have reviewed the assumptions and approach used in the calculation of unsalvaged losses, and indicate that the estimates appear reasonable.

I acknowledge the licensee's commitment in the management plan to prioritize harvesting in areas with insect infestations, disease, fire and blowdown. Having reviewed the information regarding unsalvaged timber volumes, I accept that the methodology and estimates assumed in the base case reasonably reflect current losses on the TFL. I encourage the licensee to continue to refine the estimates using data specific to the land base of the TFL which can be applied in future timber supply analyses.

Reasons for Decision

I have considered the information discussed throughout this document, and I have reasoned as follows.

For the reasons stated in 'Timber Supply Analysis' and from reviewing the considerations as recorded above, I accept the licensee's 'MoF Option' as an adequate basis from which to assess timber supply for this AAC determination.

In determining this AAC, I have identified factors which, considered separately, indicate that the timber supply may be either greater or less than that projected in the base case. Generally some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision but cannot be reliably quantified at this time. These latter factors are accounted for in determinations in more general terms.

The area of TFL 55 falls into the area considered by the Revelstoke and Area Land Use Planning Minister's Advisory Committee (RMAC), the history and purpose of which is discussed under *Revelstoke and Area Land Use Planning Minister's Advisory Committee*. In that section, I also provide my reasoning regarding the appropriateness of the reflection of the RMAC recommendations, to the extent that they are reflected in current approved practice, in this determination.

In this rationale, I have identified several factors for which I believe the base case assumptions differ from current operational practices or conditions. These factors are summarized below.

Two factors act to significantly decrease timber supply as compared to the base case projections, although not all are quantifiable:

- *operability* – The licensee included 574 hectares of areas identified as operable through 'non-conventional' harvesting methods in the timber harvesting land base. I accept the likelihood that a proportion of these areas may not in fact ever be harvested. I conclude that the uncertainty around these areas suggests that the base case harvest projection may overestimate both short- and long-term timber supply by as much as 10 percent. This indicates that short-term timber supply is very sensitive to the economic margin;

- *identified wildlife* – I conclude that the eventual establishment of WHAs and other measures to manage for identified wildlife may result in a decrease of up to 1 percent in mid- to long-term timber supply;

Three factors act to increase timber supply as compared to the base case projections, although none are quantified:

- *site productivity* – I believe that the future productivity of sites currently occupied by old growth stands may well have been underestimated in the base case harvest projection. As a result, mid- to long-term timber supply may be underestimated by up to 11 percent;
- *regeneration* – The licensee assumed a higher reliance on natural regeneration in the analysis assumptions than occurs in current practice. I accept that long-term timber supply may be underestimated by up to 2 percent on this account;
- *use of select seed* – The licensee did not assume any contribution from genetically improved seed in the base case. I believe that gains in regenerated stand yields resulting from the use of improved seed mean the long-term timber supply may be underestimated by 1-2 percent.

In consideration of the above mentioned influences, I note that only the uncertainty around the inclusion in the base case of the non-conventional areas affects short-term timber supply. In my assessment of the risks associated with the inclusion of these areas, and in consideration of the stability of short-term timber supply, I note that the review of operational plans indicates that the licensee has approximately 10 years of volume at the current AAC in approved cutblocks. Similarly, review of the twenty-year plan indicates that the base case harvest forecast is operationally attainable for at least the next twenty years. I also note that some of the stands in the non-conventional areas may prove to be harvestable, as may be demonstrated by the licensee over the term of this determination. I am mindful that the base case initial harvest level is already at a level 10 percent below that of the current AAC.

I note that several influences discussed above and in the previous sections of this rationale indicate that long-term timber supply may be more favourable than projected. As better site productivity information becomes available, and the use of select seed further influences the productivity of second growth stands, a more favourable timber supply may exist for TFL 55. Nevertheless, I do not believe that any of the factors acting to increase the mid- to long-term timber supply are sufficiently large to fully mitigate the imminent decline to the mid-term level. I note that the base case harvest forecast projects a steady decline in timber supply in this unit over the first 50 years, and I am not aware of any information at this time to indicate that under the current management regime, timber supply will not decline significantly as projected, or that there are any factors that would serve to sufficiently counter the reduction from the current AAC reflected in the base case. I therefore conclude that there is a need to begin the transition to significantly lower levels of harvest, and that it is appropriate to lower the AAC by ten percent to a new AAC of 90 000 cubic metres per year.

Finally, as discussed earlier in this document, I believe that the partition of 10 000 cubic metres to areas above the 1994 operability line from the 1996 determination is no longer required on TFL 55, and does not apply for this determination.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved on TFL 55 by establishing an AAC of 90 000 cubic metres.

This determination is effective April 18, 2001, and will remain in effect until a new AAC is determined, which must take place within five years of the date of this determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this decision and leading to the next AAC determination, I request that the licensee:

- examine the areas excluded under *non-forested and non-productive reductions*, in order to determine whether any of these areas could in fact contribute to the timber harvesting land base;
- continue to refine the operability information, including quantifying the expected implications of the small areas discussed under *stand-level biodiversity*;
- provide information on harvesting performance in the non-conventional areas;
- refine site productivity loss estimates for existing roads, trails and landings using data specific to the TFL, and develop a better approach for estimating future losses;
- refine the methodology and criteria used to determine minimum merchantability standards;
- review the modelling assumptions regarding natural regeneration to ensure that future analysis assumptions reflect current practice;
- develop a methodology to more accurately reflect management practices in riparian management areas.

In addition, I encourage the licensee staff to undertake the tasks noted below, as discussed throughout this rationale document. I recognize that the licensee's ability to undertake these projects is dependent on available staff resource time and funding. However, these projects are important to help reduce the level of risk and uncertainty associated with key factors affecting timber supply on TFL 55. I recommend that the licensee:

- refine the criteria used to exclude non-merchantable stand types;
- clarify the management objectives and expected classification of the remaining backlog NSR areas;
- collect data to obtain better site productivity information.

Ken Baker

Ken Baker
Deputy Chief Forester

April 17, 2001

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of altemative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

   (a) encourage maximum productivity of the forest and range resources in British Columbia;

   (b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

   (c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

   (d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

   (e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: **The Crown's Economic And Social Objectives Regarding Visual Resources**

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis.*

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests